

## THE STRUCTURE OF THE BINARY STAR NEBULA NGC 2346

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NGC 2346 is a high excitation nebula which has a bipolar appearance and whose obvious central star is of too late a spectral type (A5) to account for the photo-ionization of the nebula. Spectral observations at high and low resolution in the visible, and low dispersion IUE observations in the UV are combined to explain the structure of the object. The radial velocity structure indicates a cylindrical geometry, or possibly two cavities, with the ionized material in the form of thin sheets. The variation of extinction has been investigated at many positions over the nebula; the obscuration is irregular although a ring of low extinction around the central star is apparent. The central star has previously been found to be a single-lined spectroscopic binary, and its zero velocity lies midway between the positive and negative radial velocity components of the ionized material. Visible spectrophotometry of the central star is combined with long and short wavelength IUE spectra in order to determine the parameters of the cool central star and the hot binary companion. The evolutionary status of this peculiar nebula is briefly discussed.

## IUE OBSERVATIONS OF THE BIPOLAR PLANETARY NEBULA NGC 2346

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The nucleus of NGC 2346 (=PK 215 + 3<sup>o</sup>1;  $\alpha = 7^{\text{h}}06^{\text{m}}49.^{\text{s}}7$ ,  $\delta = -0^{\circ}43'29''$ , 1950) was recently discovered by Kohoutek (1982a,b) to be an eclipsing binary with a deep ( $\sim 2.^{\text{m}}2$ ) minimum in the visible and an orbital period of  $17.2 \pm 0.4$  days. We observed NGC 2346 with the IUE on 4 occasions between 1982, Feb. 24 and May 13 and obtained 6 SWP and 4 LWR low dispersion spectrograms. These were taken at different phases, using the large entrance aperture centered on the nucleus.

The radiation background was high on two occasions. A set of Vilspa observations for 1981, Feb. 6 was obtained from the National Space Science Data Center and was incorporated in our analysis.

For our 1982 observations, the IUE FES magnitude varied between  $m_v = 11.7$  and  $13.0$ . Emission line fluxes of NV, C IV, He II, O III), N<sup>V</sup> III), Si III) and C III) were measured from the SWP spectra, and C II + O III) and (Ne IV) from the LWR range. At some phases, a relatively strong emission line near  $\lambda 1700$  and another, weaker one at  $\lambda 1856$  is seen. In addition, at certain phases the continuum level rises from about  $\lambda 1600$  to  $\lambda 1950$  and is believed to be the Rayleigh-Jeans tail of the A-star seen in the visible. As was already pointed out by Mendez (1978), this star may be merely a chance coincidence with the nebula and may not be physically associated with it. The eclipsing binary nucleus may contain gas streams (cf. Kohoutek, 1982b) or possibly an accretion disk, as suggested by the asymmetric UV line profiles.

Our magnitude estimates are only accurate to  $\pm 0.1$  m and probably contain some nebular contribution, although the IUE large entrance aperture of  $10 \times 23$  arcsec is roughly equivalent to the circular apertures used by Kohoutek (15, 21, 30 and 30 arcsec). However, we have difficulty fitting the IUE magnitudes to the 17.2 days partial light curve by Kohoutek, based in primary minimum at JD 2445010.85. (Paper to be submitted to Ap. J.).

Kohoutek, L.: 1982a, IAU Circular No. 3667.

Kohoutek, L.: 1982b, Info. Bull. Var. Stars No. 2113, March 19.

Mendez, R.H.: 1978, Mon. Not. Roy. Astr. Soc., 185, 647.